**MC Lesson Plan Template:**

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| **Subject & Grade Band Theme (if New Ohio Science Standards):**  Interconnections within Systems | | **Grade Level:** 4th grade |
| **Strand of Science or Domain … highlight one (Life/Earth & Space/Physical):** Life Science | | **# of Students/class:**  24 students |
| **Class Duration in minutes:** 45 | **Day** 1,2,3 **of** 10 | **CMT’s Initials:** |

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| **Teacher Candidate’s Name:** Heidi Taviano | **Date:** November 26/27/28, 2012 |

**Lesson Rationale and/or Summary**

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| **Lesson rationale**: This learning segment provides students with opportunities to explore fossils during hands-on activities, as well as make predictions and start thinking about the types of questions that paleontologists may ask while studying fossils. The students are provided with different activities that require them to think critically, observe, ask questions, and communicate there thinking. All of these skills assist students with meeting Common Core inquiry standards, and they are vital for students to master as they develop as critical thinkers. Students are also required to create their own tools and ask questions, which will provide the students to apply what they will learn. It is important for students to be provided with these types of activities and assessments, because as they think deeply about these ideas and put them into practice, the concepts are more likely to be transferred into their long-term memory.  **Lesson summary:** This learning segment is a three-day branch from a seven-day unit about fossils. Each class length is forty-five minutes. The first day of the lesson, the students are provided with a mystery object, and are asked to make predictions about the object, while completing a handout. This activity will lead to the teacher revealing the next topic that the students will study, which is fossils. Students will then answer the question ‘what is a fossil?’ The second day of the lesson, the teacher will first read pages 4-8 from the book *Fossils*. This will then lead into a discussion about what fossils and paleontologists are. Next, students will be paired into groups of two. In groups, students will complete an observation handout using brachiopod fossils. During this time, the teacher will call individual groups to make observations using a dinosaur rib fossil. The teacher will record students’ observations, the questions that they ask, and their predictions about the fossil. Next, the teacher will begin to explain the purpose of these activities, by revealing to the students that they are going to learn about how and why scientists study fossils. Students will then complete an exit slip. The third day of the lesson, students will first read pages 76-79 in their *Science* textbook. A discussion will then be held, in which students will complete guided notes. Students will then complete a handout, in which they will create a new tool and write down questions a paleontologist should ask about a new fossil. Finally, students will complete a quick-write by answering the question ‘why and how do scientists study fossils?’ |

# Content focus: Essential Question or Enduring Understanding

**Essential Question:** How and why do scientists study fossils?

**Content, Cluster, Strand, or Standard Statement/Connection:**

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| **Ohio Revised Standards and Model Curriculum:**   * Fossils can be compared to one another and to present-day organisms according to their similarities and differences. (CCSS)   **Current Standards**   * Compare changes in an organism’s ecosystem/habitat that affect its survival.   **Science Inquiry and Application**   * Communicate about observations, investigations and explanations. * Review and ask questions about the observations and explanations of others. * **Observe** and ask questions about the natural environment.   **Learning Objectives**  *Students will be able to:*   * Infer characteristics about unfamiliar objects by making observations and recording their findings with 95 percent accuracy throughout the lesson. * Communicate their findings and ideas with others in the classroom and support their beliefs with 90 percent accuracy throughout the lesson. * Create a tool using new knowledge and skills that will assist a scientist with discovering a fossil in a new area during the extension portion of the lesson with 85 percent accuracy. * Reflect about what they learned about what they learned about studying fossils after the first three days of this lesson with 100 percent accuracy. |

**Academic Language**

**Academic Vocabulary**

* Fossil
* Era
* Paleontologist
* Prediction
* Classify

**Procedural Vocabulary**

* Describe
* Create
* Discuss
* Assist
* Observe

***Academic and procedural language is bolded in the lesson.***

**Planned Assessments:**

* **Pre-assessment**: Students will answer the question ‘what is a fossil?’
* **Formative Assessments**: Mystery object handout (predict what is inside of a brown paper sack that contains a brachiopod fossil), brachiopod observation handout, record observations of students responses during observation of a dinosaur fossil (*informal*), exit slip (drawing and prediction of dinosaur fossil), paleontologist scenario handout (create tool and write questions that paleontologists might ask about a new fossil)
* **Summative Assessment**: Quick-write (How and why do scientists study fossils?); students will take a test at the end of this unit

**Differentiated Instructional Strategies:**

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| * Place hearing impaired students near the front of the room: Aaliya, Colten, Izzac, Kyle, Terrald, and Justice. * Have Aaliya and Izzac complete group work together. Aaliya struggles with writing and Izzac is very intelligent, but he struggles with keeping on task when working independently. By grouping these two students, Aaliya will help Izzac stay on task, while Izzac will help Aaliya with her writing. * Colten is on an IEP because struggles with speech and language, but he is a very hard worker. Justice is on an IEP because she lacks confidence in her school work, especially with reading. These two students will be grouped for individual work because Colten will work hard to help Justice, while Justice can assist Colten with his speech and language needs by speaking and writing fluently. * Jaret and Kyle need to be separated, because they both struggle with keeping organized and on task. * Students who are on IEP’s and 504 will be seated together in the corner of the room. This will allow the intervention specialist to monitor their progress more easily and assist the students with their reading and keeping on task. * Izzac, Aaliya, and Payton struggle with reading comprehension. Izzac and Payton also struggle with remaining on task. Therefore, these students will be provided with completed guided notes, rather than having to fill in the blanks. |

**Lesson Resources:**

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| **DAY ONE:**   * Mystery Object handout * Brown paper bags (12) * Brachiopods (12) * Pre-assessment slip (What is a fossil?) * YouTube Video ([*http://www.youtube.com/watch?v=3DpfXjo8-gY&feature=relmfu*](http://www.youtube.com/watch?v=3DpfXjo8-gY&feature=relmfu))   **DAY TWO:**   * Gallant, R. A. (2001). *Fossils.* Tarrytown, NY:Benchmark Books * (2007). *Science*. Boston, MA: Houghton Mifflin * Brachiopods (12) * Brachiopod handout * Microscopes (12) * Dinosaur rib fossil * Paper to record student responses, while they are observing dinosaur * Prediction/Drawing Exit Slip   **DAY THREE:**   * Gallant, R. A. (2001). *Fossils.* Tarrytown, NY:Benchmark Books * (2007). *Science*. Boston, MA: Houghton Mifflin * Guided notes (24 copies) * Dinosaur rib fossil * Brachiopod fossil (1 to hold up in front of the class) * Paleontologist scenario (24 copies) * Coloring supplies * Quick-write (24 copies) |

**Procedures (Four Components)**

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| **I. Readiness/Motivation for Lesson:**    **DAY ONE:**  **Engage: (45 minutes)**   * “Good morning, ladies and gentleman! I hope all of you had a good night’s sleep, because I have a big job for you to do today. In fact, this task is not being completed for me. Rather, you are going to be **assisting** a scientist today. Who can tell me what the term **assists** means? * Possible responses: * To help someone * To try to make someone’s job easier * Pass out ‘Mystery Object’ handout to students and ask a volunteer to read the scenario aloud. * **Scenario: “What is this?** Recently, a scientist discovered a new object. She is struggling to **classify** the object, because she has never seen anything like it before, so she needs your help! You have been given one of these objects in a brown paper sack. It is important that all of these objects make it back to the scientist in good condition. Therefore, do not throw, smash, or hit these bags with another object. Answer the following questions below and try to help the scientist determine what the object is so she can inform the scientific community of her new discovery!” * After reading the scenario, ask students the following questions: * What does the word **classify** mean? * Allow students to respond and then reveal the definition: *to group or organize something based on specific characteristics* * What is the scientist asking you to do? * Students should state that the scientist is asking them to **observe** an object without looking at it and try to determine what the object is. They should also state that they are being asked to complete the handout given to them. * Explain to students that **observe** means to ‘look at closely’. * What rules do we need to follow when completing this activity? * Do not put anything in or near the mouth. * Do not through, smash, or swing around the bags containing the mystery objects. * Do not look at the mystery object. * Respect others ideas. * Do not get out of your seat without permission. * Raise your hand if you have any questions. * Are there any questions? * Encourage students to ask any questions that they have before beginning the activity. * When all questions are answered, reveal to students who their partners will be and have them move to designated areas throughout the room. * “You and your partner may now move to the area in the room that has been assigned to you. I am now passing out a mystery object to each of you.” * Pass out brachiopod **fossils** inside of a brown paper bag to each group. * “You and your partner will use this mystery object to complete the handout given to us by the scientist. Please remember, do not open your bag to look at the object, unless you are given permission to do so. You may begin.” * Give students 25 minutes to complete this activity. During this time, students will be using the mystery object to complete the following questions on their handout.  1. How heavy is the object? 2. **Keep the object in the bag.** Does the object feel like another object that you have seen before? 3. What do you think the object looks like? 4. What other characteristics can you describe? 5. What do you think the object might be? 6. **Do not look at the object**, but open the bag, reach in and feel the object. Does this change your hypothesis about what you think the object might be? 7. Below, make a drawing of what you think the object might look like.  * During this time, walk around the room, facilitate discussions, and answer any questions that the students might have. * Keep students on task by asking them questions, such as: * Could you compare the weight of this object to another object? * Does the object feel like a solid, liquid, or a gas? * Does the object feel like another object that you have seen before? * What do you **predict** that this object might be? * Place your hand in the bag and feel the object. What does the object feel like? Is it   similar or different from anything that you have felt before?   * Can you draw what you think the object might look like? * Do you have a hypothesis for what the object is? * Students may have misconceptions during this activity: * They may believe the purpose of the activity is only to find out what the object is.   *Rather, the purpose is to model questions that scientists might ask about objects.*   * Students may think that there is only a rock in the bag when they are focusing on   size, weight, and shape of the object. *Encourage students to focus on the details.*  *Explain to them that the scientist has seen rocks before, therefore, the object*  *must have details that make it different from a rock.*   * After 25 minutes, have students return to their seats and begin a discussion about the activity that they completed. * “Who would like to share what they found during this investigation?” * Select a student to explain their findings. * Ask the student: * What **predictions** did you have about the object before pulling it out of the bag?   *Be sure that students know* ***prediction*** *means a guess about an event or object.*   * Did your **prediction** change when you opened the bag and touched the object? * What kind of questions do you think a scientist would ask about an object that   they have never seen before? *Students may only repeat questions similar to those*  *on their handout, but encourage them to come up with different ones, such as:*   * Where was this object found? * Have other objects been found similar to this one? * How old is this object? * What is inside of this object? * How did this object form? * Have several students have explained their findings, tell the students they may take their objects out of their bags. * Ask the students, “after looking at the mystery object, can anyone tell me what it is called?” * Possible answers: *a rock, a stone, a* ***fossil****, a remnant* * “The mystery object that the scientist wanted us to help **classify** is a **fossil**! We are going to be spending the next week learning about **fossils**. We will be talking about why scientists study **fossils** and how scientists study them. We will also be learning about what **fossils** can tell us about the past.” * Next, have students complete a pre-assessment by writing the answer to this question on a slip of paper to turn in: “What is a fossil?” * **Closure:** This day will end by students watching a video about **fossil** hunting. This video will model how paleontologists search for **fossils**.   [*http://www.youtube.com/watch?v=3DpfXjo8-gY&feature=relmfu*](http://www.youtube.com/watch?v=3DpfXjo8-gY&feature=relmfu)   * *Students will learn that they need a permit to hunt* ***fossils*** *along with other tools.*   **II. Lesson Development: *Explore, Explain, Extend***  **Day Two:**  **ENGAGE: (5 minutes)**   * To begin today’s class, the teacher will read pages 4-8 in the book *Fossils*. * After reading, the teacher will begin a short discussion. * “Would anyone like to summarize for me what we just read from the book *Fossils*?” * Students should state that: * **Fossils** can be made from many different types of animals and plants. * We can learn a lot about Earth’s past by studying **fossils**. * **Fossils** are dug up from the ground by scientists (paleontologists). * After having a brief discussion, move to exploration portion of the lesson.   **Explore: (30 minutes)**   * Now that we have discussed a little more about what **fossils** are, we are going to do a few different activities. We are going to work together in pairs for this portion of class. Before we begin, can someone please remind me of our expectations for group work? * Remain on task. * Only talk about the work that you are completing. * Listen to and respect others ideas. * Ask before getting up out of your seat. * Raise your hand if you have a question. * Then explain to students what they will be doing during today’s class. * “During class today, you will be completing two activities. One activity will involve you and your partner observing the **fossils** that we looked at yesterday. Today, you will make closer and more detailed **observations** and record your findings on a handout that I will give you in a few minutes. The second activity will involve you and your partner making an hypothesis about another type of **fossil**. You will be called up in pairs to the desk in front of the classroom to complete this activity. I will explain this part better when it is your turn to complete the activity. Does anyone have any questions?” * Allow students to ask questions that they have about the activities. * Then, reveal to students who their partners are for the activity and begin to pass out the handout, as well as the brachiopod **fossils**. * After all students are seated with their partners and have begun to work on their handout, call up groups one at a time to **observe** a dinosaur **fossil**. While students are completing this activity, first, explain to them that you would first like them to look at and make **observations** about the **fossil**. **Do not tell them what the fossil is.** Then, allow them to have a few minutes to look at the **fossil** with a microscope. During this time, circulate the classroom and answer any questions that students might have about the brachiopod activity. * After giving the students who are observing the dinosaur **fossils** a few minutes, sit back down with them and ask them several questions: * Why would a scientist be interested in studying this type of **fossil**? * What questions might a scientist ask if they found this **fossil**? * How do you think this **fossil** was created? How long ago? * How do you think the **fossil** was found? What tools do you think the scientists used? * Describe the color, texture, and size of the **fossil**. * How do you think the **fossil** was created? * What organism do you think this **fossil** was made from? * Students may have the following misconceptions during this activity: * They will believe that the **fossil** could not be from an organism because it feels too much like a rock. * They will think that the **fossil** was created only a few hundred years ago, because they do not understand the fossilization is a lengthy process. * When asked what questions a scientists might ask, students may only ask generic questions, like ‘what is this’. * Write down questions and unique responses that students have during this discussion. These remarks will be used later in this lesson, during the explanation portion. * After all students have completed this activity, have all students return to their seats and begin the explanation portion of this lesson.   **Explain: (10 minutes)**   * “Now that we have **observed** different types of **fossils**, I would like to take a few minutes for us to share as a class what we found out or learned during these activities.” * Give students a few minutes to share their ideas. * Possible student responses: * Students may share their **predictions** about the type of organisms the **fossils** came from. * Students may state that they learned that scientists look at many different features when **observing** **fossils**. * Students may state that scientists ask many different types of questions when studying **fossils**. * Students may comment about how they believe that **fossils** take a long time to form. * After allowing students to discuss their ideas for a few minutes, reveal to students that the purpose of these activities was to get them familiar with how scientists study **fossils**. * “After completing these activities, how do you think scientists go about studying **fossils**?” * Students should respond by stating: * “By asking questions and making careful observations.” * “Yes! Scientists who study **fossils** do so by looking closely (observing) these objects and asking many questions about them. Why do you believe it is important for scientists to ask many questions about what they are studying?” * Possible responses: * They want to know as much as possible about the fossil. * The more questions they ask, the easier it will be to determine what the object is. * Scientists have to be very careful and specific to make sure that they are doing their job correctly. * “These are all very good answers! Tomorrow we will be talking more about how and why scientists study **fossils**. Tonight for homework, I would like you to pre-read pages 76-79 in your textbook before we do this together as a class tomorrow.” * **Closure:** I am passing out an exit slip. I would like you to create a drawing of the fossil that you observed with me and your partner at the desk in front of the class. I would also like you to write down your **prediction** about what this object is.” * Allow students to leave when all materials are put away and their workspace is organized.   **Day Three:**  **Explain: (25 Minutes)**   * First, begin a discussion with students about the exit slips they completed yesterday before leaving class. * “Who believes they made the correct **prediction** about what the object is we **observed** in class yesterday?” * Allow students to share answers. Then reveal to students that the fossil is actually the rib of a dinosaur fossil. * “Does anyone know how long ago dinosaurs roamed the Earth?” * Allow students to respond. * “I am not going to tell you the correct answer, but I want you to keep this question in your minds today. First, we are going to begin by reading a few pages in our textbook.” * Have students take turns reading pages 76-79 in their textbook aloud. * After the reading, pass out guided notes that will be completed together. * Within the guided notes, students will define the following words: * **Fossil**: preserved traces and remains of an organism that lived long ago * Tell students the ‘mystery object’ was a fossil, known as a brachiopod.” * **Era**: major divisions of time that last about a million years * Reveal to students that dinosaurs lived in the Mezosoic Era. This particular dinosaur fossil is a rib bone from a dinosaur in the late Jurassic period (145 million years ago). It was found in Utah. * **Paleontologist**: scientist who study **fossils** * **Predict**: to make a guess about an event or object * **Classify**: to group or organize something based on specific characteristics * Formally, the teacher should also explain why and how scientists study **fossils**. * **Why**: “Scientist study **fossils** to learn about Earth’s history. Scientists learn about how organisms lived in the past, what they looked like, and what they ate. Using this information, we can also learn about different characteristics of the Earth, such as, what the climate was like, and what landforms use to be located on the Earth.” * Emphasize that scientists can determine what types of organisms lived on Earth and how these animals lived by looking at specific features, such as, their bone structure (to determine how they moved) or their teeth (to determine what they ate). * Also state that scientists can use this information to determine how organisms are related to one another. * Misconception: *Students may believe that just because organisms have similar features means they are related.* Explain to students that this is not always the case. * **How**: “Scientists study **fossils** by asking questions, making careful observations, and comparing this information to what they already know about the Earth and its history.” * Remind students of the specific questions that they were asking during the activities that they completed and how they created drawings of their observations. * ‘How do you think this fossil was created? How long ago? * How do you think the fossil was found? What tools do you think the scientists used? * Describe the color, texture, and size of the fossil. * How do you think the fossil was created? * What organism do you think this fossil was made from? * “Scientists ask these questions and use the information that they use to compare their findings with information that they already know to learn more about Earth’s history.”   **Extend: (15 minutes)**   * Students will be provided with a scenario about **paleontologists** who are studying **fossils** that they have never seen before. First, the students will create drawings of a new tool that the **paleontologists** can use to find **fossils** in this new area. The students will also be asked to write down questions that the **paleontologists** should be asking, while trying to **classify** this new fossil. * During this time, the teacher should walk around the room, facilitate the students learning, and answer any questions that the students might have. * Questions that students might have: * How do I know what materials are available to me to create this new tool? *Encourage the student to be creative, and tell them that they are not limited to what materials could be used.* * Students may ask, what types of questions the scientists would ask about the fossil. *Encourage the students to discuss with one another and to look back in their notes to assist them, rather than providing them with the answer.* * After students have been given 15 minutes to complete this activity, ask a few students to share what they came up with. * What type of tool did you create? Why did you create it? What questions might the paleontologists ask when classifying this fossil? Why do you think they might ask these questions?   **Evaluate: (5 minutes)**   * Before students leave class, have them complete a quick-write. This quick-write will consist of students answering the following question: * How and why do scientists study **fossils**? * **Closure:** Read pages 11 and 23 from the book ***Fossils***. This will lead into the next lesson, which involves what **fossils** can reveal about the past. * After the reading and students complete the quick-write, ask the students to organize their areas and then allow them to leave.   **SCIENCE SAFETY PRECAUTIONS AND RULES:**   * Explain to students: * Materials should not be placed in or close to their mouths. * Materials should be kept at your workspace and should not be moved around the room. * Objects should not be thrown, rather, they should remain on their desks for observations. * Remain in seats, unless given permission to do otherwise. * Listen to and respect others ideas.   **III. Lesson Closure: Summarize,Link**   * **Day one:** video **(**[*http://www.youtube.com/watch?v=3DpfXjo8-gY&feature=relmfu*](http://www.youtube.com/watch?v=3DpfXjo8-gY&feature=relmfu)**)** * **Day two:** exit slip (Create a drawing and make a prediction about dinosaur **fossil**.) * **Day three:** read pages 11 and 23 from the book *Fossils*   **IV. Evaluate: Put Formative Assessment here - if not embedded in plan.**   * **Pre-assessment**: Students will answer the question ‘what is a fossil?’ on a slip of paper and turn it in at the end of class. This will occur before the teacher explains the formal definition of a fossil. * **Formative assessments**: * Students will complete a ‘Mystery Object’ handout, which will help them start to think about questions scientists might ask about unknown objects. * Students will complete a handout, while making observations about brachiopod fossils. * ***Informal:*** The teacher will record student responses, while they are answering questions and making predictions about the dinosaur fossil. * Students will complete an exit slip, which will involve them creating a drawing of the dinosaur fossil and writing a formal prediction about what they believe the fossil is. * Students will complete a handout, which will involve them creating a new tool for paleontologists to use to discover a new fossil. The students will write down questions that the paleontologists should ask after they discover the new fossil. * **Summative assessments:** * Students will complete a quick-write at the end of this learning segment. They will answer the questions: “How and why do scientists study fossils?” * Students will take a test at the end of this unit.   **V. Enrichment Activities (Optional, as prescribed by instructor)**   * Provide students with directions and a list of materials that they can use to make their own **fossils** at home. Remind them that they must have their parents’ permission before completing this activity. * Ask students to write their own stories or scenarios about **paleontologists** discovering **fossils**. |